Research, Engineering and Development Advisory Committee

Subcommittee Report -Aircraft Safety (SAS)

> Terry McVenes, SAS Chair October 20, 2021



SAS Meeting August 10-11, 2021 Day 1

- FAA Budget Report Beth Delarosby
- FY2021 Aircraft Safety Assurance Portfolio Mark Orr
- FY2021 Digital Systems & Technology Portfolio Accomplishments – Mark Orr
- FY2021 Environmental & Weather Impact Mitigation – Mark Orr
- FY2021 Human Performance & Aeromedical Factors Accomplishments – Mark Orr
- FY2021 Aviation Performance & Planning Portfolio Accomplishments – Mark Orr
- Use of UAS Research Outputs Paul Strande

SAS Meeting August 10-11, 2021 Day 2

- Strategic Planning Approach Industry
- February F&Rs Eric Neiderman
- Industry Inputs on AI/ML
- F&E Research, Engineering & Development John Maffei
- JAMS COE Ahmet Oztekin
- PEGASAS COE William Crosby (Purdue)
- COVID-19 Concerns/Discussion
- UAS Research Stephen Luxion (ASSURE COE)

SAS Meeting August 10-11, 2021 Other Significant Items

- AI/ML and Icing F&R will be closed
 - Keep focus for future meetings
- Broadening of SAS industry membership

Finding #1 – Transfer of NAS Related Technology from NASA to FAA

- NASA periodically transfers NAS-related technology to the FAA for further maturation and deployment.
- NASA may not have matured some of these technologies to a NASA Technology Readiness Level (TRL) 6, where it has been tested in a relevant environment.
- Some of these technologies have been placed in FAA projects funded by F&E rather than RED funds and, therefore, not presented to the SAS for review.
- NASA transfers to FAA can also have forms of other technology such as data, concepts of operations, technical manuals, etc. which helps inform future FAA decisions and technology roadmap definitions.

The SAS recommends that all NASA technology transfers to FAA that have not reached a NASA TRL 6 maturity level be included in future briefings to the SAS such that the subcommittee will have adequate information upon which to base its advice on RED funding and prioritization to the FAA. This will further ensure sufficient relevant environment evaluation exists for successful implementation decisions. It is also recommended that the SAS receive briefings on low-TRL work in progress on the non-technology knowledge transfers from NASA such as data and documentation which are used to help inform FAA decisions. This will provide SAS members a better understanding of long-term RED portfolio and direction.

To address the broader level of other on-going NASA research, the SAS recommends that NASA provide periodic briefings to the SAS on those topics of research that may be applicable to our scope of oversight. It is further recommended that this be addressed as a recurring agenda item at future SAS meetings with rotating topics of interest.

Finding #2 – Electric Aircraft Research

- Research in the A11L Unmanned Aircraft Systems landscape is timely and appropriate.
- However, as technology advances a new Budget Line Item should be added for electric powered aircraft.
- Further in-depth research can aid industry to address this new and emerging technology appropriately.

The FAA should conduct research exclusively on electrically powered UAS including flight planning requirements and a correlation of battery level to an emergency or minimum fuel equivalent. This research should apply to both small UAS as well as advanced air mobility (AAM) type UAS. Any inability of a UAS to not have adequate power supply and reserves can impact the users of the NAS. Included in the F&R, specific addressing of battery standards, tolerances, capabilities, crash worthiness, and effects on battery performance by the range of anticipated temperatures and altitudes, and fire hazards (including suppression) should be researched.

Finding #3- UAS Radio Frequency Spectrum

- Research in the A11L Unmanned Aircraft Systems landscape is excellent.
- Various segments of the radio frequency spectrum have recently been allocated and assigned for auction.
- There can be safety and interference hazards with reassigned frequencies that may be adjacent to those required by manned aviation.
- In certain cases, shielding may not be an appropriate measure of mitigation nor a protective "guard band" may be enough to protect, critical, often safety of life systems on manned aviation.

The FAA should research and test the radio frequencies that are used by low altitude UAS including those that operate unmanned traffic management (UTM) systems and or Beyond Visual Line of Sight (BVLOS). Additionally, the research should examine the appropriateness of the utilization of non-aviation networks by small UAS, as well as overall latency and integrity issues in communications.

Finding #4- UAS Airframe Icing

- The FAA research in A11D budget line item for Aircraft Icing is appropriate.
- UAS airframe icing is lacking for study to close research gap.
- As these present unique designs are vastly different from traditional transport aircraft, therefore potential testing methods may also differ.

The FAA should expand the research landscape to include that of UAS icing. This research will cover all types of UAS from small to large, as well as Advanced Air Mobility (AAM) type aircraft. Icing studies should include airframe, engine, and rotor icing. Without adequate research, ice accretion could cause a catastrophic condition affecting users of the NAS, both in the air, and on the ground.

Finding #5- UAS Safety and Security Technologies

- For the research being conducted in the A11L Unmanned Aircraft Systems landscape, it is critical that UAS enter the market with the appropriate safety and security technologies.
- These technologies should include standardized operational protocols that are expected by those in manned aviation.
- Certain technologies that may be labeled with a safety function should be researched as a check and balance to the overall safety system.

The FAA should research the capabilities of all "turn-key" technologies that allow mission completion right out of the box where most often no pilot input is involved. This includes evaluation of all technologies that would permit this capability and evaluate risks that would be posed. Additionally, safety and security features, such as "geofencing," "return to base," "lost link," and other safety risk mitigation technologies should be evaluated and a basis for standardization established from the data. The standardized performance of these features is needed to ensure that the safety and security protocols protect all members of the NAS.

Finding #6- Role of Landscapes in Prioritizing BLIs

- Both industry and FAA placed much effort in developing the Research Landscape for the National Airspace System 2020-2030 that was last updated on February 14, 2020.
- This landscape document identified important areas of "research drivers" that would provide an external force or motivation that may stimulate R&D investment.
- From the SAS members' perspective, it has become unclear as to how the research landscape effort is currently being used in the prioritization process when developing BLI items for the research portfolio.

It is recommended that the FAA provide a briefing to the SAS on how the research landscape document that was developed with both industry and FAA input is being used to identify both gaps in the current R&D portfolio as well as in the prioritization of future BLI items for research.

SAS Meeting

Next Meeting:

March 1-2, 2022

Questions?